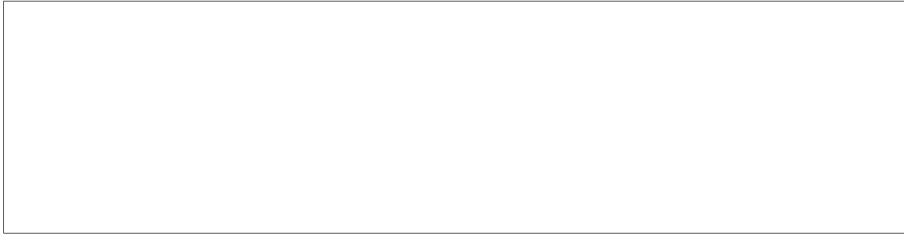


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The Problems of Camouflaging the Air Defense
Forces of the Country Against Space Reconnaissance
by
General-Leytenant V. Sozinov

In the activities of US space reconnaissance, which is being conducted with ever-increasing intensity, a major place is assigned to obtaining data on the structure and technical equipment of air defense of the Soviet Union and other countries of the socialist camp. Various types of artificial earth satellites are used to perform these tasks.

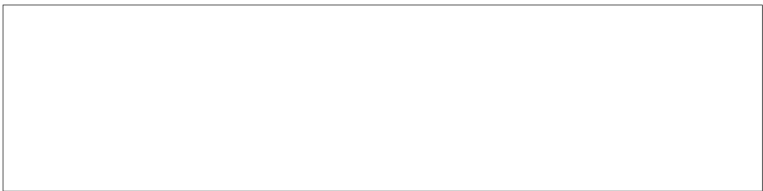
Thus, photographic reconnaissance from space is carried out by means of Samos satellites, which have photographic equipment with a high resolution capability (1 to 2 meters) mounted on board. Radiotechnical reconnaissance is conducted by Ferret-type satellites, the equipment of which makes it possible to determine not only the nature of an emission, but also its function, as well as the location of the operating station. Reconnaissance tasks also are performed by Discoverer satellites; photo or radiotechnical reconnaissance equipment may be mounted on them.

The conduct of space reconnaissance by the American military command naturally requires developing and implementing corresponding counter-measures, among which camouflage is of paramount importance.

Camouflaging the Air Defense Forces of the Country is a highly complex matter. The forces and means of formations of the Air Defense Forces of the Country are distributed over considerable territory. Accordingly the disposition of airfields, launch positions, command posts, radar centers, technical bases and other installations remains unchanged for an extended period of time. The troops continuously carry on their combat duty to protect the air space of the Soviet Union and systematically engage in combat training, which requires the constant peacetime use of radio-electronic means, aircraft flights etc.

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We intend to express a few observations on organizing the camouflage of the air defense system, based on the experience of the Moscow Air Defense District. Before doing so we would like to note, however, that despite the development of space means, aerial reconnaissance conducted by using photo and radiotechnical means has not lost its importance. This is



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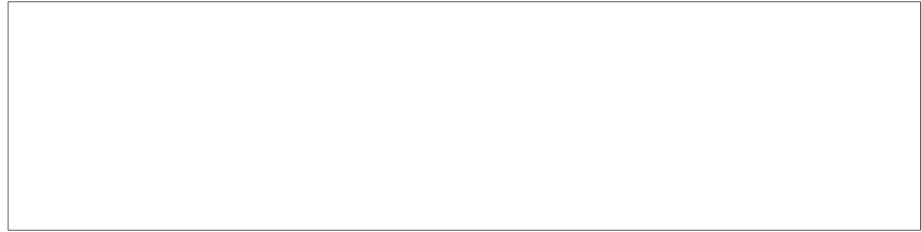
corroborated by the experience of the Vietnam war, and also by the exercises of the US strategic air forces. Therefore, measures to camouflage troops against space reconnaissance means must be accompanied by measures to camouflage against aerial reconnaissance activities, taking into account the fact that the principles of camouflaging troops and installations against both space and aerial reconnaissance (especially photoreconnaissance) are essentially the same.

Camouflage against space reconnaissance includes a body of measures, of which the main ones are: organizing the warning of troops about the approach of artificial earth reconnaissance satellites; camouflaging launch positions, command posts, airfields and installations against space photoreconnaissance; and camouflaging radioelectronic emitting devices against space radio and radiotechnical reconnaissance. In combination with camouflage, measures to deceive the enemy must also be implemented.

The planning and organization of camouflage and deception measures on the scale of a formation, as experience has shown, should be done by the district headquarters or separate air defense army. The camouflage and deception plan developed must reflect the measures implemented by the troops both in peacetime and during combat actions. In particular, it is necessary to project the order of priority and time required for carrying out the work to camouflage launch positions, airfields, command posts, radio and radar means and various installations, based on the way in which they are located in an area and in the overall air defense system; and to determine the forces and means required for camouflage. In accordance with the formation plan, the subordinate staffs develop similar plans for large units and units.

Organizing the warning of troops regarding the time of overflight of artificial reconnaissance satellites. When there is a continuously operating system of monitoring space, the time of passage of a satellite over any one area or installation may be determined in advance (with a lead of several days). On the basis of this forecast commands and staffs are able to warn troops in advance and take steps to counteract reconnaissance from space. Our calculations have shown that the command posts of air defense formations must receive information regarding the flight of artificial satellites over their territory with a lead time of up to three days. This information, after appropriate processing, must be transmitted to subordinate troops to allow it to be received by large units two days, and by units no later than one day, before the reconnaissance satellites of the probable enemy enters their perimeters.

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The information must contain the coordinates of the points at which the satellites are projected to orbit the surface of the earth within the perimeters of the large units (units), the date and time the satellite is to overfly these points, and also the altitude of flight. The information obtained is processed by the personnel of the duty shifts of the command posts. For this purpose plotting boards are set up at the command posts, and globes, maps, warning systems and other equipment are used.

The commanders and staffs, having received information regarding the overflight of reconnaissance satellites, implement the necessary camouflage measures in accordance with the plans.

Camouflage of combat dispositions against photoreconnaissance satellites. Camouflage procedures and methods are largely determined by the length of time the combat dispositions have been located in a given place. It is one matter if the airfield or position has been functioning for a long time, and another if it is just being established.

When new weapons systems are being deployed it is necessary to thoroughly consider camouflage requirements, beginning from the moment the project documents are prepared. Even in the process of searching out a location for them on the basis of aerial photography and analysis of radar maps of the terrain, the possibility of concealing the installation and combat equipment from reconnaissance from space must be determined.

When selecting areas in which to construct the installations, the composition of the reconnaissance groups (commissions), must include camouflage specialists, and the technical documents on carrying out camouflage operations at the installations should be given to the construction organizations even before construction is begun. It seems to us that this procedure needs to be legally formalized, and that new installations must be turned over for operation only after all of the camouflaging operations have been carried out. Only in that instance will it be possible to maintain camouflage in proper condition and, through improvement, achieve the effective concealment of installations and troop groupings.

Of especially great importance is the camouflage of roads, which are the main revealing features of all large-scale air defense installations. Projected roads and those under construction should be integrated into the existing road network and the minimum number of forks, crossroads and deadends should be planned, while the intra-installation roads should be camouflaged especially carefully, taking terrain conditions into account.



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The concealment of roads through technical procedures is possible only on individual segments; attempts to conceal large segments of roads as a rule are not yet producing positive results.

Data from monitoring aerial photography show that by skilful use of the camouflaging properties of the ground and terrain features, combined with the use of standard and improvised means, it is possible to achieve high camouflage effectiveness. However, it is not always possible to eliminate the revealing features of positions and large areas which possess sharply defined outlines of roads and installations; therefore, to camouflage the most important installations and troop groupings, in some cases dummy positions and installations should be created which make it possible to conceal the overall system of actual troop combat dispositions. The distance of the dummy positions from the real ones is chosen so as to rule out the destruction of a combat position in the event of a nuclear strike in the vicinity of the dummy one. They should be prepared at the same time as the real ones. To maintain the dummy installations and positions, special camouflage groups should be formed in air defense large units and units, since the implementation of the whole body of camouflage measures involves a considerable amount of work. ✓

Dummy positions prepared from standard inflatable mock-ups of combat equipment are best made up when the threat of the onset of combat actions arises, since their deployment in peacetime might be detected by ground visual reconnaissance and, in addition, it is expensive. ✓

The most prevalent and rapidly effected camouflage procedure, and therefore the one most acceptable in the troops, is to color equipment and structures the same as the terrain background. With the proper combination of protective and distorting paint this procedure is a good contribution to concealing the equipment and installation from recognition. However the manufacturing plants paint equipment one color, e. g., dark green or light green; to repaint it in several colors under field conditions twice per year (summer and winter) is quite expensive.

The problems of camouflaging troops against enemy space reconnaissance have to be worked out daily--in the process of routine activities, and also in exercises, training sessions, etc. For example, an overflight of photo-reconnaissance satellites requires covering combat equipment with camouflage means, limiting the movement of personnel and transportation, etc. At dummy positions, combat activity and the movement of people and transportation are simulated. 50X1-HUM



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An effective camouflage means may be to smokescreen positions, airfields, radar centers, radio centers and rear installations. However, the use of smoke right in the combat dispositions of units and subunits may affect the combat effectiveness of the troops; therefore it has to be used mainly to camouflage important structures and rear installations. It should be noted that the effectiveness of enemy photoreconnaissance activities may be affected a great deal by complex meteorological conditions (for example, cloudiness, fog). This has to be taken into consideration when implementing practical measures to camouflage against enemy photoreconnaissance activities.

Camouflage against radiotechnical reconnaissance from space includes implementing measures to conceal the emissions of the radar means of the radiotechnical and antiaircraft missile troops, and also of the systems for controlling fighter aviation and troops in the ultra-shortwave band. These measures at the moment of overflight of an artificial earth satellite may involve:

- the strict limitation of the operation of emitting means;
- the prohibition of the emission operation of new models of radioelectronic equipment;
- the development of dummy sources of electromagnetic emissions by using obsolete types of radar sets and specially developed simulators operating in a wide frequency band. The development of special, simply constructed, and cheap simulators is very much a burning question. Such simulators, in our view, must operate in various emission modes and ensure the creation of false radioelectronic conditions.

We now will dwell on the operating routine of radioelectronic means. Experience has shown that upon an overflight of radiotechnical reconnaissance satellites, by the decision of the commanders of units and subunits, radar sets and ultra-shortwave band radio transmitters not engaged in the direct performance of a combat task should cease operating. In addition, it is necessary to limit or suspend periodic servicing and other operations to check combat equipment involving emission into the ether. At the same time, during the overflight of the radiotechnical reconnaissance satellites and upon a signal from the unit command post, the obsolete types of radioelectronic means set up at the dummy positions must be activated to operate for deception purposes. In the radiotechnical troops, to ensure operational efficiency during an overflight of reconnaissance satellites, the use of radar sets, mainly of the obsolete type, should be provided for.



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Considering the whole complexity of radio camouflage measures implemented in the troops and the capabilities of modern means of space radio reconnaissance, we think it necessary to establish limits for emission into the ether.

In this connection we would like to mention, that when new models of radiotechnical equipment are developed and tested, the camouflage of radio emissions still is not completely ensured. Certainly, to conceal the operation of these means from enemy reconnaissance after they are received by the troops is highly complex; we have to introduce certain limitations on their use, which in turn causes additional difficulties in operating these means and in the final analysis affects the combat readiness of the units.

Constant attention must be given in the air defense forces to preventing the disruption of the routines in which radioelectronic means of all types are used. The difficulty of this important work is that all the daily activities of the troops are based on the use of various types of radioelectronic devices; the majority of these possess considerable emitting powers and can be monitored even from space.

To counteract enemy reconnaissance it is desirable to systematically monitor the radio camouflage of the radioelectronic means and their operation on substitute antennas, to clarify the limits of zones of possible reconnaissance of radioelectronic means, and to implement a number of other measures. To ensure security of operation when checking and repairing the onboard equipment of rockets at repair facilities, judging from troop experience, good results may be produced by shielding the ceilings and walls of the technological spaces in them with brass grids and metallic surfacing. At the airfields of fighter aviation, shielded spaces should be prepared for repairing and checking radio equipment on reserve codes. However this work is still being done by the old method. If the troops were given the technological designs for completing this work, obviously it would be possible to increase the effectiveness of shielding.

Work expeditors can make a substantial contribution to solving the problems of camouflage. In our country, for example, the forces of military specialists of repair organs have developed more improved substitute antennas for missile guidance stations, which, when used, facilitate radio camouflage in the antiaircraft missile troops and create more favorable conditions for conducting combat training of troop personnel.

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Industry and the scientific research institutes can provide a great deal of assistance to improving radio camouflage equipment. They must develop an improved security device in new models of radioelectronic equipment, and also modernize the existing device appropriately.

An indispensable ally of radio camouflage under modern conditions is radio deception. Only when they are conducted in combination, according to a single, thoroughly considered concept, can good camouflage results be obtained. Such a concept, in our opinion, must be developed initially for certain theaters of military operations and strategic axes, with further detail for each of the formations, large units and units of all branches of the armed forces.

Practical consideration of a number of measures of camouflage against space reconnaissance naturally helps the personnel acquire certain useful skills and makes it difficult for the probable enemy to carry out reconnaissance tasks. At the same time, despite the considerable work being done in the troops on camouflage, it appears to us that there is still very much to be done to arrive at the best solution to this important problem. The troops still have no improved camouflage means and yet these means are being developed without sufficiently allowing for the future development of weapons and improvements in reconnaissance means, and as a result a number of new models of camouflage equipment rapidly become obsolete after they are accepted into the armament. The great diversity of camouflage means makes it difficult to cope with them, and complicates the organization of supply, repair and restoration.

The necessity to quickly provide the troops with effective camouflage means is making itself very keenly felt, as is the need for a sound assessment of the technical capabilities for, and the economic feasibility of, developing new camouflage means. Air defense formations and large units obviously need to have an appropriate organ capable of training troops and implementing a body of camouflage measures in a skilful manner.

It also has become very important to supply troops with operating dummy equipment to simulate missile equipment, aircraft, motor vehicles, etc. This work must be performed at a high technical level, using modern materials, and must sufficiently ensure the deception of the enemy regarding the true troop grouping.

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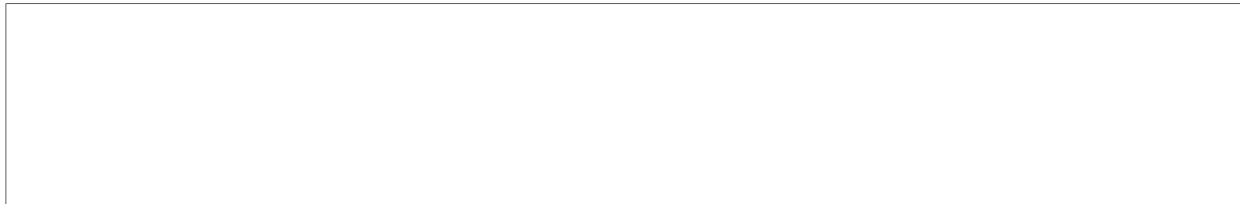
In conclusion, we should point out that to counteract enemy space successfully, a single strong, scientifically based system of camouflage is needed for all branches of the armed forces and arms of troops. It must



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correspond to the nature and methods of conducting modern warfare, and allow for the specific characteristics of each branch of the armed forces and arm of troops, and the way and conditions in which they carry out their combat tasks.

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